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Ceramic Water Filters for the Developing World

The production of clean drinking water is particularly challenging in the developing world where there is limited technology for water treatment. Ceramic water filters composed of locally available and sustainable materials (clay and rice husks) can be used to filter water at an adequate rate while removing turbidity and water borne pathogens. Important challenges in creating these filters exist in the labor-intensive process of grinding rice husks to appropriate sizes. This research explores the effects of several rice husk pretreatment methods, including roasting and sieving, on filter performance. It has been observed that roasting the husks to temperatures ranging from 100°C to 200°C results in more friable husks, thus reducing the time and labor required to grind them down before sieving and separating by diameter sizes ranging from 300 μm to 850 μm . The success or failure of these test discs with varying rice husk particle size is measured by the effluent filtration rate and by the effluent turbidity. Discs containing smaller rice husk fractions ($x < 850 \mu\text{m}$) are the most reliable and provide higher than expected effluent filtration rates while discs composed of larger size fractions ($850 \mu\text{m} < x < 300 \mu\text{m}$ and $x > 300 \mu\text{m}$) and of unprocessed husks fail to maintain their composition while filtering and break. In testing, a steady slowing of the effluent filtration rate also has been observed and its cause (which is believed to be cementation of the clay) is being examined. The composition of successful test discs and the most efficient pretreatment methods may later be applied to full-sized ceramic filters to be used in the developing world.

Keywords: Ceramic water filters, water treatment, turbidity removal, developing world